

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
1 April 2004 (01.04.2004)

PCT

(10) International Publication Number
WO 2004/027597 A3

(51) International Patent Classification⁷: **G06F 7/72**

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(21) International Application Number:
PCT/IB2003/003949

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(22) International Filing Date:
10 September 2003 (10.09.2003)

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0221837.8 20 September 2002 (20.09.2002) GB

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,

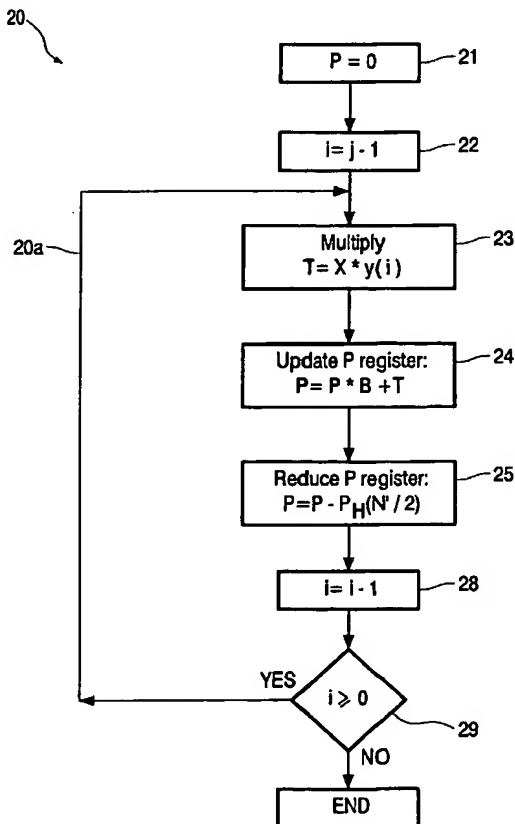
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[Continued on next page]

(54) Title: **QUISQUATER REDUCTION**



(57) Abstract: A method and apparatus for calculating the product P of a first number X and a second number Y, modulo N, where Y is partitioned into j words each of length p bits, and has a length (m + n) bits, cyclically operates on successive ones of the j words of Y, carrying out intermediate modulo reductions of the intermediate products formed. A specially selected multiple, N', of N is used so that only a single reduction of the intermediate product P is never longer than (m+n) bits at the end of each cycle. N' is an integer multiple of N, and the value N' is selected such that the (m - 1) most significant bits are equal to '1', and the least significant bit is '0'.

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SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:

11 November 2004

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F7/72

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHEDMinimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 366 673 B1 (VAN DIJK MARTEN E ET AL) 2 April 2002 (2002-04-02) abstract column 3, line 1 - column 6, line 9 -----	1-15
A	ORTON G ET AL: "A DESIGN OF A FAST PIPELINED MODULAR MULTIPLIER BASED ON A DIMINISHED-RADIX ALGORITHM" JOURNAL OF CRYPTOLOGY, NEW YORK, NY, US, vol. 5, 1992, pages 183-208, XP000669945 abstract figures 1,4 -----	1-15
A	DE 101 42 155 C (INFINEON TECHNOLOGIES AG) 23 May 2002 (2002-05-23) abstract page 6, line 59 - page 7, line 37 page 8, line 15 - page 9, line 52 figures 4-7 -----	1-15

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Date of the actual completion of the International search

7 September 2004

Date of mailing of the International search report

04/10/2004

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6366673	B1	02-04-2002	EP 0938790 A2	01-09-1999
			WO 9914880 A2	25-03-1999
			JP 2001505325 T	17-04-2001
DE 10142155	C	23-05-2002	DE 10142155 C1	23-05-2002
			WO 03021424 A2	13-03-2003
			EP 1421474 A2	26-05-2004